

# Work Order ID 58173

April 27, 2010 9:22:22 AM



Page 1

Item ID: D212-664-101

Accept



Setup Start



Revision ID:

Item Name: Crosstube Fwd

Stop



Start Date: 27/04/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 11/05/2010 Req'd Qty: 1.00

Customer:

Reference:

Approvals:

Process Plan:

Date: 10-4-27 Tooling:

Date:

Run Start



QC:

Date: SPC (Y/N):

Date:

Stop



Sequence ID/  
Work Center ID

Operation  
Description

Set Up/  
Run Hours

Draw  
Number

Draw  
Rev.

Plan  
Code

Accept  
Qty

Reject  
Qty

Reject  
Number

Insp.  
Stamp

Draw Nbr

Revision Nbr

D212-664-141

Rev D

100

0.00



DOCUMENT CONTROL

DC

Memo

0.00

Document Control

Photocopy bluefile and create labels as per PPP D212-664-101 CHG003

S 10/05/05

4a BG 10/05/04

110

0.00



Pick Kit  
Packaging

Memo

0.00

Packaging

Packaging

(IX) MB 10-04-28

120

0.00



BENDING MACHINE - CROSSTUBES

Memo

0.00

CNC Bend 2

CNC Alpha 160 Bender

Bend tube as per Dwg D212-664-141 using CNC bender program 212-fw and Folio F2015

D212-664-101

10.04.28

(IX) MB 10-04-28

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

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Page 2

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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130  QC Quality Control	QC15- Crosstube Dimensional Check  Memo	0.00  0.00	8 10/04/08						
140  Crosstubes Crosstubes	Crosstubes  Memo 1-Drill pilot holes in tube as per Dwg D212-664-141 using drill Jig DT8548 & DT8549 ✓  2-Ream hole to finish size in tube as per Dwg D212-664-141 using drill Jig DT8548 & DT8549. Check dimensions between holes, both sides on both cuffs, to ensure alignment with saddle holes.  3-Scribe part # and batch # using vibrating stylus as per Dwg D212-664-141  4-Deburr & Inspect for surface damage. Repair damage within limits as per Dwg D212-664-141	0.00  0.00							

MB  
10-04-28MB  
10-04-29

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval, Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Page 3

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Approvals:

Process Plan:

Date:

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run

Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run HoursDraw  
NumberDraw  
Rev.Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

150

Crosstubes Chemical Conversion

0.00

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

Chemical Conversion Coat within 24 hours of bending and drilling

1

-

-

AWM  
10-4-29

160

QC5- Inspect part completeness to step on W/O

0.00

QC

Memo

0.00

Quality Control

S 10/04/29

10

170

Outsource process - NDT per QSI038 4.1

0.00

Outsource2

Memo

0.00

Outsource process - NDT

Liquid Penetrant Inspection as per QSI 038  
Issue P/O: 11786  
LPI as per ASTM 1417 Level 2  
Attach copy of NDT results to work order

C2

10/14/29

①

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval, Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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Page 4

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Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
180	Receive & Inspect for Damage & Mat'l Certs	0.00							
	Packaging								
Packaging	Memo	0.00							
Packaging	Ensure copy of NDT results attached to work order.								
190	QC5- Inspect part completeness to step on W/O	0.00							
	QC	0.00							
Quality Control	Inspect for damage & ensure results are as per Dwg D212-664-141								

*Revised* *(2)*

*10* *04* *30* *(1)*

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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April 27, 2010 9:22:22 AM



Page 5

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Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run HoursDraw  
NumberDraw  
Rev.Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

200



SprayPaint

Spray Painting

Spray Painting per QSI005 4.2

0.00

SprayPaint

Memo

0.00

1-Prime inside and outside crosstube as per QSI 005 4.2  
2-Paint outside crosstube with White Imron as per QSI 005 4.2

PRIME:

Start Time: 7:30Finish Time: 8:30

PAINT:

Start Time: 12:30Finish Time: 1:30

10 04 30 ①

210



QC

Quality Control

QC14- Inspect Spray Paint

0.00

Memo

0.00

Then, Wrap in plastic bag to protect from scratches

45 10-05-03

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

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Page 6

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Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
220  Crosstubes	Crosstubes	0.00							
Crosstubes	Memo	0.00							
Crosstubes	1- Lightly scuff the bonded area using a 320 grit sand paper and clean the area with 41058 wash 'n' wipe 2-Install supports with magnobond as per QSI 015 Adhere for for 12 Hrs A/R 6398 Magnobond Batch: <u>114021</u> exp: <u>01/2011</u> <u>Torque: ml 10.05.04</u>								
230  QC	QC5- Inspect part completeness to step on W/O	0.00							
Quality Control	Memo	0.00							
240  Packaging	Pick Kit	0.00							
Packaging	Memo	0.00							

10 05 03 ①

5/10/04

④

10.5.45

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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April 27, 2010 9:22:22 AM



Page 7

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Start Date: 27/04/2010 Start Qty: 1.00



Cust Item ID:

Required Date: 11/05/2010 Req'd Qty: 1.00



Customer:

Reference:

Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_  
QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Run Start



Stop



Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Draw Number	Draw Rev.	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
250  QC Quality Control	QC4- 100% Inspect kits for completeness  Memo	0.00 0.00							
			8 w/lostos			④			
260  Packaging Packaging	Packaging  Memo Identify and pack for shipping as per PPP D212-664-101	0.00 0.00							
			NEUR						
270  QC Quality Control	QC21- Final Inspection - Work Order Release  Memo	0.00 0.00							
						10/05/06			
						CZ 10/5/14			

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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**NOTE:** Date & initial all entries

# Picklist Print

April 27, 2010 9:22:27 AM

Page 1

Work Order ID: 58173

Parent Item: D212-664-101

Parent Item Name: Crosstube Fwd

Comments: IPP Rev:E 04.02.16 Reformat KJ/DS  
IPP Rev:F 06-03-29 Remove Coments on Pick List JLM  
IPP Rev:G 07-04-30 As per Rev C JLM

Start Date: 27/04/2010

Required Date: 11/05/2010

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Remaining	Qty	Date	Status
D212-664-101TRN		Manufactured	No			110	Each	3.0000	1.0000			
Crosstube Turning Detail												

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
LG	3	
57439	1	
57440	1	
57868	1	

D3595-063-450	Manufactured	No				230	Each	54.1200	4.2105			
RUBBER CUSHION												

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
LG	54.12	
52447	9.12	
53775	45	

MS21920-25	Purchased	No				220	Each	72.0000	4.0000			
Clamp(per MIL-DTL-8783C)												

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
ST451	72	
109181	25	
113282	46	
113744	1	

B-58032 MB 10-04-28

MA 10 05 03

4.2105

MA 10 05 03

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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April 27, 2010 9:22:27 AM

Page 2

Work Order ID: 58173

Parent Item: D212-664-101

Parent Item Name: Crosstube Fwd

Comments: IPP Rev:E ☐ 04.02.16 ☐ Reformat ☐ KJ/DS  
 IPP Rev:F 06-03-29 Remove Coments on Pick List JLM  
 IPP Rev:G 07-04-30 As per Rev C JLM

Start Date: 27/04/2010

Required Date: 11/05/2010

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Remaining	Qty	Date	Status
D2893-1		Manufactured	No			220	Each	63.0000	2.0000			



2.75 Support

Warehouse Loc Qty Loc Code

Location

Main Warehouse

LG

63

51775

6

53125

15

53340

2

53774

20

56354

20

*10.05.03*

D3428-1

Manufactured No

240

Each

8.0000

1.0000



Placard

*10-5-48*

Warehouse Loc Qty Loc Code

Location

Main Warehouse

ST056

8

55565

8

April 27, 2010 9:22:27 AM

Shop Packet Print

Page 2

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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April 27, 2010 9:22:27 AM

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IPP Rev:F 06-03-29 Remove Coments on Pick List JLM  
IPP Rev:G 07-04-30 As per Rev C JLM

Start Date: 27/04/2010

Required Date: 11/05/2010

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Remaining	Qty	Date	Status
AN6-35A		Purchased	No			240	Each	82.0000	4.0000			
											10-5-45	
BOLT												

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
ST343	82	
112805	2	
113422	30	
114341	50	

AN6-36A	Purchased	No				240	Each	99.0000	4.0000			
											10-5-45	
Bolt												

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
ST343	99	
112314	3	
113121	46	
114530	50	

April 27, 2010 9:22:27 AM

Shop Packet Print

Page 3

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Start Date: 27/04/2010

Required Date: 11/05/2010

Comments: IPP Rev:E 04.02.16 Reformat KJ/DS

Start Qty: 1.00

Required Qty: 1.00

IPP Rev:F 06-03-29 Remove Coments on Pick List JLM

IPP Rev:G 07-04-30 As per Rev C JLM

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Remaining	Qty	Date	Status
MS21042L6	Purchased		No			240	Each	433.0000	6.0000			
											10-5-48	
Nut												

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
ST300	433	
111578	233	
114495	200	

AN960JD616

Purchased

No

240

Each

13.0000

18.0000

Washer NBS114900663

Warehouse	Loc Qty	Loc Code
Location		
Main Warehouse		
ST347	13	
113149	13	

April 27, 2010 9:22:27 AM

Shop Packet Print

Page 4

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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

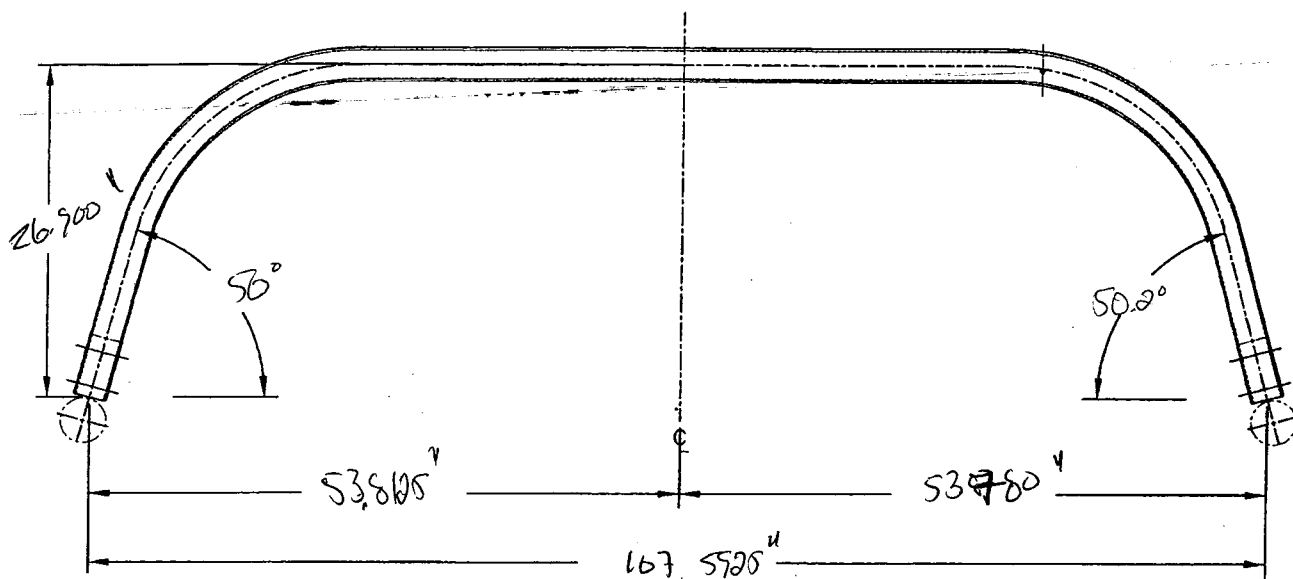
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**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>	<b>Work Order:</b> 59177
<b>Description:</b> Crosstube High Fwd (205/212/412)	<b>Part Number:</b> D212-664-101
<b>Inspection Dwg:</b> D212-664-141 <b>Rev:</b> 40	<b>Page 1 of 1</b>

Required Dimension	Min	Max
Height	26.79	27.05
1/2 Span	53.59	53.85
Angle	49	52
Total Span	107.18	107.7



Comments

QC15 Inspection	S
Date	10/04/06

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	07.05.31	Dimensions updated per Dwg Rev C	KJ/JM	

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
				#7				
				18577				

**NOTE:** Date & initial all entries



Item	Qty -141	Qty -141B	Part Number	Description
1	X		D212-664-141	CROSSTUBE ASSEMBLY (205/212/412 HIGH FWD)
2		X	D212-664-141B	CROSSTUBE ASSEMBLY (214 HIGH FWD)
3	1	1	D6005-128	CROSSTUBE
4	2	2	D2893-1	SUPPORT
5	4	4	D3595-063-450	RUBBER CUSHION
6	4	4	MS21920-25	CLAMP (OR MS21920-26)
7	A/R	A/R	MAGNOBOND 6398	ROCKWELL SPECIFICATION RBO-120-023 ADHESIVE (TEXTRON/BELL SPEC. 299-947-100, TYPE II, CLASS 2 ADHESIVE)

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6005-128  
FINISHED LENGTH = 126.514±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D212-664-XXX" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS
- 7) WEIGHT: D212-664-141 = 33.6 lbs (PER IIN-D212-664)  
D212-664-141B = 33.6 lbs (PER IIN-D212-664)
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN CUTTER OFF PART. BLEND OUT EDGE LONGITUDINALLY. TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 3 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2893-1 SUPPORT USING 0.03" TO 0.06" THICK LAYER OF MAGNOBOND 6398 TO THE SURFACE OF D2893-1 THAT WILL BE IN CONTACT WITH THE CROSSTUBE PER QSI 015. LET CURE FOR 12 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-25 CLAMPS (OR -26) WITH D3595-063-450 RUBBER CUSHIONS TO SECURE THE D2893-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE OF CROSSTUBE SUPPORT.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) TORQUE CLAMPS 80 TO 100 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 58173  
*PS 0-4-27*

**RELEASED**  
2009-10-29  
*NY*

D	REFORMAT/REVISE GENERAL NOTES/PART LIST; REORGANIZED VIEWS AND REFORMATTED DRAWING TO CURRENT STANDARDS; ADD -141B (ZN B4-2, D4-2); REMOVED REF & ADD TOLERANCES (ZN B4-3, C6-3, C8-3 & B6-3); RELOCATED FLAG #6 PER PAR 08-046 (ZN A5-3); MOVED TURNING DETAIL & UPDATED TOLERANCE TO SHEET 4	RF	09.09.30
C	REMOVE -851 ABRASION STRIP; ADD MAGNOBOND 6398, CUSHION, REVERSE CLAMPS	PH	07.03.08
B	ADD HOLES FOR COMPATABILITY WITH BHT/AA SKIDTUBES	PH	05.02.04
A	NEW ISSUE	PH	00.12.12
REV.	DESCRIPTION	BY	DATE
DESIGN	<i>PH</i>	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	<i>PH</i>	DRAWING NO.	REV. D
MFG. APPR.	<i>PH</i>	D212-664-141	SHEET 1 OF 4
APPROVED	<i>PH</i>	TITLE	SCALE
DE APPR.	<i>PH</i>	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
DATE	09.09.30	COPYRIGHT © 2000 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

8 7 6 5 4 3 2 1

12 13 15  
D2893-1 SUPPORT  
MS21920-25 CLAMP, 2X  
D3595-063-450 RUBBER CUSHION, 2X  
2 PL

A4-2

A

14.00 (-141)  
OR 13.75 (-141B)

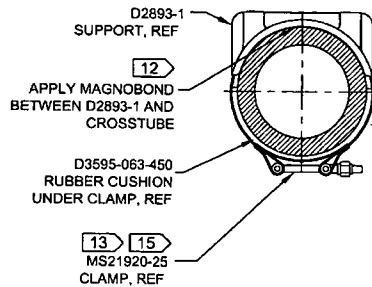
D

D212-664-501  
BENT TUBE

SYM

**D212-664-141/-141B**  
**ASSEMBLY DETAIL**

D



**SECTION A-A** D5-2  
SCALE 4X

W/O 58173

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2009-10-29  
W/P

DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	92	DRAWING NO.	REV. D
MFG. APPR.	DS	D212-664-141	SHEET 2 OF 4
APPROVED	12	TITLE	SCALE
DE APPR.	11	XTUBE ASS'Y (205/212/412 HI FWD)	NTS
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8 7 6 5 4 3 2 1

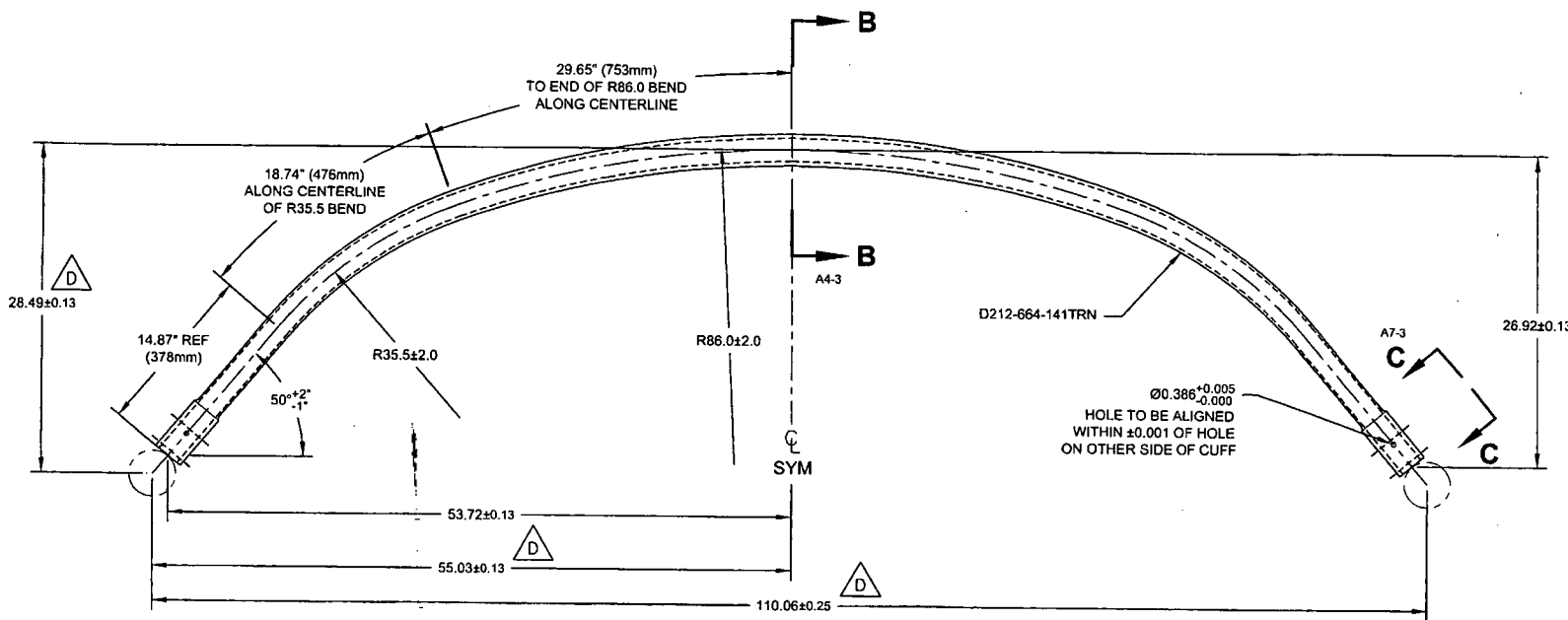
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DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

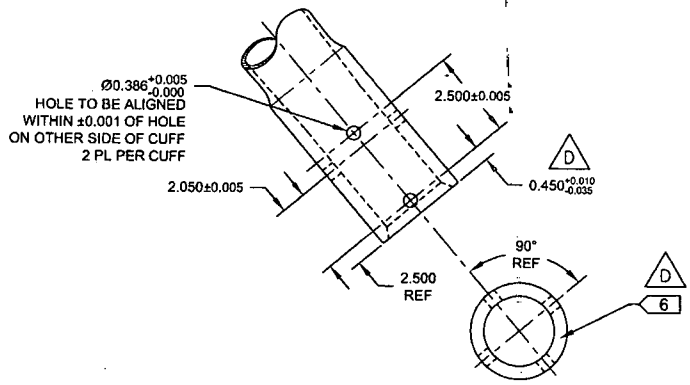


**D212-664-501**  
**BENDING AND DRILLING DETAIL**

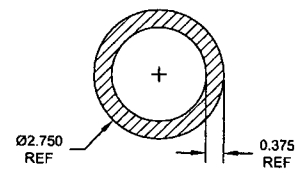
10 D

*w/o 58173*

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 2009-10-29  
*MP*



**VIEW C-C: CUFF DETAIL**  
 SCALE 3X



**SECTION B-B**  
 SCALE 4X

DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9	DRAWING NO.	REV. D
MFG. APPR.	10	D212-664-141	SHEET 3 OF 4
APPROVED	11	TITLE	SCALE
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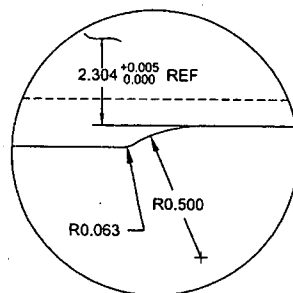
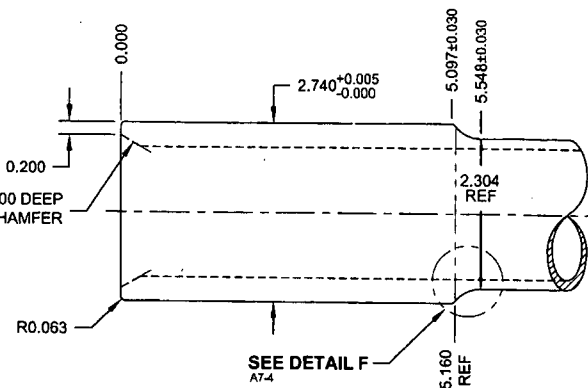
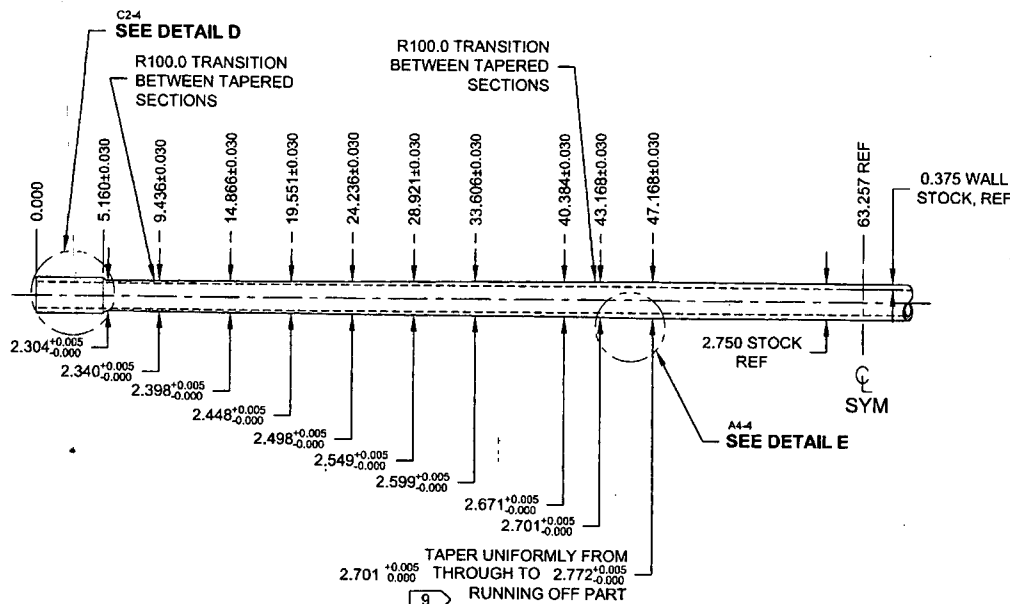
W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

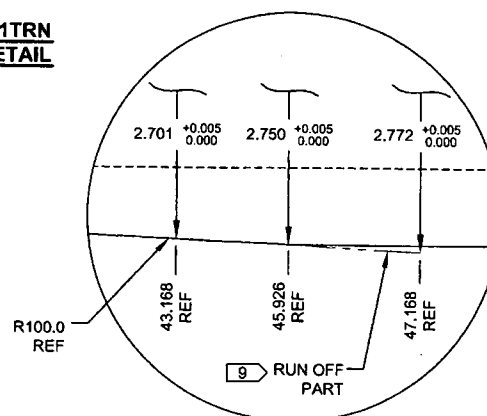
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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



**DETAIL F:  
CUFF TRANSITION** C2-4  
SCALE 10X

**D212-664-141TRN  
TURNING DETAIL**



**DETAIL E:  
TAPER RUN-OFF** C5-4  
NOT TO SCALE

W/058173

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2009-10-29

DESIGN	PH	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
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MFG. APPR.	PS	D212-664-141	SHEET 4 OF 4
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Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



## PARTS LIST

## HIGH GEAR CROSSTUBES

Item	101	201	203	Part Number	Description
	X			D212-664-101	CROSSTUBE INSTALLATION 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
		X		D212-664-201	CROSSTUBE INSTALLATION 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
			X	D412-664-203	CROSSTUBE INSTALLATION, 412 HIGH AFT
				D212-664-141	CROSSTUBE ASSEMBLY 204/205/210/212/214/412, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH FWD
2		1		D212-664-241	CROSSTUBE ASSEMBLY, 204/205/210/212/214, UH-1H, UH-1A/B/E/F/L/P, TH-1F/L, HH-1K HIGH AFT
3			1	D412-664-243	CROSSTUBE ASSEMBLY, 412 HIGH AFT
10	2			* D2893-1	SUPPORT
11	4			* D3595-063-450	RUBBER CUSHION
12	4			* MS21920-25	CLAMP (OR MS21042-26)
13	1			AN6-35A	BOLT
14	1			AN6-36A	BOLT
15	6			MS21042L6	NUT (OR MS21042-6)
16	18			AN960JD616	WASHER
20	2			D2940-1	SUPPORT
21	4			D3595-063-530	RUBBER CUSHION
22	4			MS21920-28	CLAMP (OR MS21042-30)
23	4			AN6-40A	BOLT
24	2			AN6-41A	BOLT
25	6			MS21042L6	NUT (OR MS21042-6)
26	18			AN960JD616	WASHER
27			1	D2896-1	SUPPORT
28			2	D2856-600-1009	ABRASION STRIP
29			2	D3595-063-570	RUBBER CUSHION
30			4	MS21920-28	CLAMP
31			2	MS21920-30	CLAMP (OR MS21042-32)
32			4	AN6-40A	BOLT
33			2	AN6-41A	BOLT
34			6	MS21042L6	NUT (OR MS21042-6)
35			18	AN960JD616	WASHER
36			2	D3189-1	CHAFING SHIELD
50				D3428-1	PLACARD

REFERENCE ONLY. PARTS ARE INCLUDED IN D212-664-141/241 OR D412-664-243 ASSEMBLIES ABOVE  
 NOTE: KITS INCLUDE EXTRA HARDWARE FOR COMPATIBILITY WITH BOTH DART AND BELL/AA  
 SKIDTUBES.

# Dart Aerospace Ltd

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

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DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries



## LIQUID PENETRANT TEST REPORT

P- 05484

PAGE 1 OF 1

CLIENT DART AEROSPACE DATE April 29/2010 TIME AM ☒ PM ☐  
ATTENTION LINDA KACILE CHANTRE/IAN ACUREN JOB NO. 188-10-0673  
ADDRESS 1270 ABERDEEN ST. PO/VO NO. L1286  
HAWKESBURY, ON WORK LOCATION AS ADDRESS  
ACCEPTANCE STD. ASTM1417/AST-038 REV./DATE 2005  
PROJECT FP 1 ON 4 X "CROSS TUBE"  
ITEM(S) EXAMINED JOB# SEE W.O.# BELOW

JOB DESCRIPTION PERFORMED A "WET-FLUORESCENT-QUICK PENETRANT" INSPECTION ON 100% OF THE EXTERNAL SURFACE  
PROCEDURE NO. LT-002 REV./DATE 2008 TECHNIQUE NO. LT-002 REV./DATE 2008  
PART NO. ALUMINE ALUMINIUM MATERIAL ALUMINE ALUMINIUM THICKNESS ---  
SCOPE PERFORMED A "WET-FLUORESCENT-QUICK PENETRANT" INSPECTION ON 100% OF THE EXTERNAL SURFACE

TEST DETAILS  
METHOD ☒ FLUORESCENT ☐ VISIBLE ☒ WATER WASH ☐ SOLVENT REMOVABLE ☐ POST EMULSIFIED  
FAMILY BRAND MAGNAFLUX BLACK LIGHT S/N 13798 ☒ OUTPUT > 1000  $\mu$ W/cm<sup>2</sup> ☒ AMBIENT < 2 fc  
PENETRANT 2L-67 MINIMUM DWELL TIME 10 MIN. LIGHTING EQUIP. ☐ FLASHLIGHT ☐ TROUBLELIGHT ☐ OUTPUT > 100 fc @ SURFACE  
PENETRANT REMOVER WARR MINIMUM DRY TIME > 10 MIN. OTHER ---  
DEVELOPER SKD-52 MINIMUM DWELL TIME 10 MIN. LIGHT METER S/N --- CAL DUE DATE May-10-2010  
DEVELOPER TYPE ☒ NON AQUEOUS ☐ AQUEOUS ☐ DRY

TEST SURFACE  
SURFACE CONDITION ☐ AS GROUND ☐ AS WELDED ☐ MACHINED ☐ SHOT BLASTED ☒ CLEAN BARE METAL  
SURFACE TEMPERATURE ☐ < -4°C/ 20°F ☐ -4°C/ 20°F TO 10°C/50°F ☒ 10°C/50°F TO 52°C/125°F ☐ > 52°C/125°F

RESULTS- ☐ METRIC ☒ IMPERIAL

-WET FLUO L.P.I. ON 100% EXT. SURF.

1. CROSS TUBE W.O. ID 58172 ✓  
2. CROSS TUBE W.O. ID 58173 ✓  
3. CROSS TUBE W.O. ID 58174 ✓  
4. CROSS TUBE W.O. ID 57532 ✓

"CROSS TUBE"

ITEM ID: - D212-664-101 (ITEMS #1 & 2)  
- D412-664-203 (ITEMS #3 & 4)

NO REJECTABLE INDICATION WAS DETECTED AS PER APPLICABLE STANDARD

10 04 30

Scope of Services  
The agreement of Acuren Group Inc. to perform services extends only to those services provided for in writing. Under no circumstances shall such services extend beyond the performance of the requested services. It is expressly understood that all descriptions, comments and expressions of opinion reflect the opinions or observations of Acuren Group Inc. based on information and assumptions supplied by the owner/operator and are not intended nor can they be construed as representations or warranties. Acuren Group Inc. is not assuming any responsibilities of the owner/operator and the owner/operator retains complete responsibility for the engineering, manufacture, repair and use decisions as a result of the data or other information provided by Acuren Group Inc. In no event shall Acuren Group Inc.'s liability in respect of the services referred to herein exceed the amount paid for such services.

Standard of Care  
In performing the services provided, Acuren Group Inc. uses the degree, care and skill ordinarily exercised under similar circumstances by others performing such services in the same or similar locality. No other warranty, expressed or implied, is made or intended by Acuren Group Inc.

SIGNATURES

CLIENT REPRESENTATIVE Ben Tiley PRINT Ben Tiley SIGNATURE Ben Tiley DTR # E48626

TECHNICIAN (SIGNATURE): [Signature] NAME (PRINT): Vives Desrosiers 1<sup>st</sup> TECHNICIAN CGSB LEVEL 2 SNT LEVEL 2 CGSB REG. NO. 3049

2<sup>nd</sup> TECHNICIAN CGSB LEVEL --- SNT LEVEL --- CGSB REG. NO. ---

REPORT REVIEWED BY: NAME INITIALS